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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/926,260	10/03/2001	Noriyuki Suzuki	011268	8663

23850 7590 05/19/2004

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EXAMINER	
WYROZEBSKI LEE, KATARZYNA I	

ART UNIT	PAPER NUMBER
1714	

DATE MAILED: 05/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/926,260	SUZUKI ET AL.	
	Examiner	Art Unit	
	Katarzyna Wyrozebski	1714	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

In view of applicant's amendment to the claim requiring that the clay be untreated following new prior art has been found.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

2. Claims 1-3, 5-7, 9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 contains limitation of a ratio of a layered phyllosilicate equivalent area circle diameter. With respect to the above limitation it is not clear as to what this ratio is measured against.

Claim Rejections - 35 USC § 102

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 1-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Matabayas (WO 98/29499).

The discussion of the disclosure of the prior art of MATABAYAS from paragraph 2 of the office action mailed on 7/9/2003 is incorporated here by reference.

The prior art of MATABAYAS is still applicable against present claims, since MATABAYAS clearly states that both treated or untreated platelets can be dispersed in the dispersing medium such as water and glycols prior to or during contact with polyester components such as monomers (page 10, lines 3-6). In example on page 22 (line 9) discloses that the oligomer as well as monomer can be utilized and then polymerized to form a polyester nanocomposite. Use of untreated clays is therefore clearly envisaged and otherwise taught in the disclosure of MATABAYAS.

Claim Rejections - 35 USC § 103

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

6. Claims 1-3, 8, 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over BEALL (US 5,760,121).

The prior art of BEALL discloses process of making nanocomposite in polymer matrix, wherein the clay is not pre-treated.

In the prior art of BEAL the phyllosilicate is a layered clay such as smectite clay or mica, that is further incorporated into water or mixture of water and organic solvent such as ethanol (col. 10, lines 1, 52-55). Specific clays include montmorillonite, vermiculite and the like (col. 11, lines 16-25). Clay platelets have thickness of 3-10 angstroms (col. 4, lines 63-65) and aspect ratio of 200-2000 (col. 7, lines 35-37). With proper calculation, the range of the diameter would therefore be between 60-2000 nm (Aspect ratio = diameter/length or thickness).

The prior art of BEALL also discloses that the clay can be intercalated with water soluble/water dispersible low molecular weight polymer (col. 15, line 37 to col. 16, line 30). Samples of the polymer include copolymer of benzoic acid/phthalic anhydride/trimethylol ethane, which is a polyester. Col. 16, lines 41-43 also disclose other polyester intercalants.

The matrix polymer of BEALL is a melt processible polymer and it includes esters as well (col. 20, lines 28-35). Polyesters are further listed as preferred embodiment in col. 21, line 67.

The composition comprising matrix polymer and untreated clay is then incorporated into an extruder and melt-processed to obtain molded article having exfoliated clay (col. 24, lines 32-35 and lines 56-57).

In example 4, the prior art of BEALL discloses use of monomers of polyester for intercalation where monomer causes increase of basal spacing and when polymerized causes exfoliation of the clay platelets.

Additives in the process of BEAL include nucleating agents, fillers, plasticizers, impact modifiers, lubricants, mold release agents, colorants and the like (col. 24, lines 6-13).

Nanocomposites of the prior art of BEAL utilize untreated clay with polymers such as polyesters, which can be formed *in situ* by condensation reaction of lower molecular weight components.

In the light of the above disclosure it would have been obvious to one having ordinary skill in the art at the time of the instant invention to utilize the process or disclosure of the prior art of BEALL and thereby arrive at the present invention. The prior art of BEALL teaches and suggests utilizing polyester intercalants as well as polyester matrix polymers.

7. Claims 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over BEALL (US 5,760,121) as applied to claims 1-3, 8, 9 above, and further in view of MATABAYAS (WO 98/29499).

The discussion of the disclosure of the prior art of BEALL from paragraph 4 of this office action is incorporated here by reference.

The difference between the present invention and the disclosure of BEALL is the recitation of the viscosities of the polyester utilized in clay nanocomposites and presence of glass fibers.

With respect to the above difference, the prior art of Matabayas discloses a composite, which according to the example on page 22 (lines 17-19) has intrinsic viscosity of 0.7 dL/g and low shear melt viscosity of 261×10^3 P at a temperature of 280°C. Table 2 of the prior art of Matabayas further discloses shear melt viscosity in a range of 0.04-139 $\times 10^3$ P also at 280°C. Although the prior art of Matabayas did not provide specific ratios as required by the present

invention, the limitations of the claims are bound to be inherent for the following reasons. The pressure (torr), the extruder speed (rpm) and the temperature (usually 280°C) in the prior art of Matabayas are encompassed by the pressure, extruder speed and temperature of the present invention. Therefore the polyester of Matabayas requires approximately the same conditions to form nanocomposite and the polyester of the present invention.

Additives that can be utilized in the composition of the prior art of Matabayas include glass fibers (page 12, line 15).

The prior art of MATABAYAS discloses more specific type of the polyester that can be utilized to make nanocomposites with clay that can be untreated.

In the light of the above disclosure, it would have been obvious to one having ordinary skill in the art at the time of the instant invention to utilize the polyester of MATABAYAS in the disclosure of BEALL and thereby obtain the present invention. Use of such polyester would also provide formation of polyester nanocomposite.

8. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matabayas (WO 98/29499) in view of Ohara (JP 9-143359).

The discussion of the disclosure of the prior art of Matabayas from paragraph 2 of the office action mailed in 7/9/2003 is incorporated here by reference.

The difference between the present invention and the disclosure of the prior art of Matabayas is addition of the polycarbonate into the molding composition.

With respect to the above difference the prior art of Ohara discloses composition comprising polycarbonate, polyester and intercalated clay containing onium ions.

The addition of the polycarbonate results in a composition having good mold flow properties and does not allow burr to appear. The composition has also good chemical resistance and heat resistance.

In the light of the above disclosure, it would have been obvious to one having ordinary skill in the art at the time of the instant invention to utilize combination of polyester and polycarbonate in order to form a nanocomposite of Matabayas and thereby obtain the claimed invention. Addition of polycarbonate would not impair the properties of the composition of the prior art of Matabayas and in fact it would have good mold flow, chemical resistance and heat resistance.

9. Claim 7 rejected under 35 U.S.C. 103(a) as being unpatentable over BEALL (US 5,760,121) in view of Ohara (JP 9-143359).

The discussion of the disclosure of the prior art of BEALL from paragraph 6 of this office action is incorporated here by reference.

The difference between the prior art of BEALL and the present invention is use of polycarbonate together with polyester.

The discussion of the disclosure of the prior art of OHARA from paragraph 8 of this office action is incorporated here by reference.

Polycarbonate is a polymer that is taught by the prior art of BEALL however not together with polyester. At the same time, the prior art of BEALL does not exclude use of polycarbonate with polyester. The addition of the polycarbonate results in a composition having good mold flow properties and does not allow burr to appear. The composition has also good chemical resistance and heat resistance.

In the light of the above disclosure it would have been obvious to one having ordinary skill in the art to utilize polycarbonate with polyesters and thereby obtain the claimed invention. Addition of polycarbonate would further impart good chemical resistance, heat resistance and decrease the burr.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katarzyna Wyrozebski whose telephone number is (571) 272-1127. The examiner can normally be reached on Mon-Thurs 6:30 AM-4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on (571) 272-1119. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Katarzyna Wyrozebski
Primary Examiner
Art Unit 1714

May 12, 2004